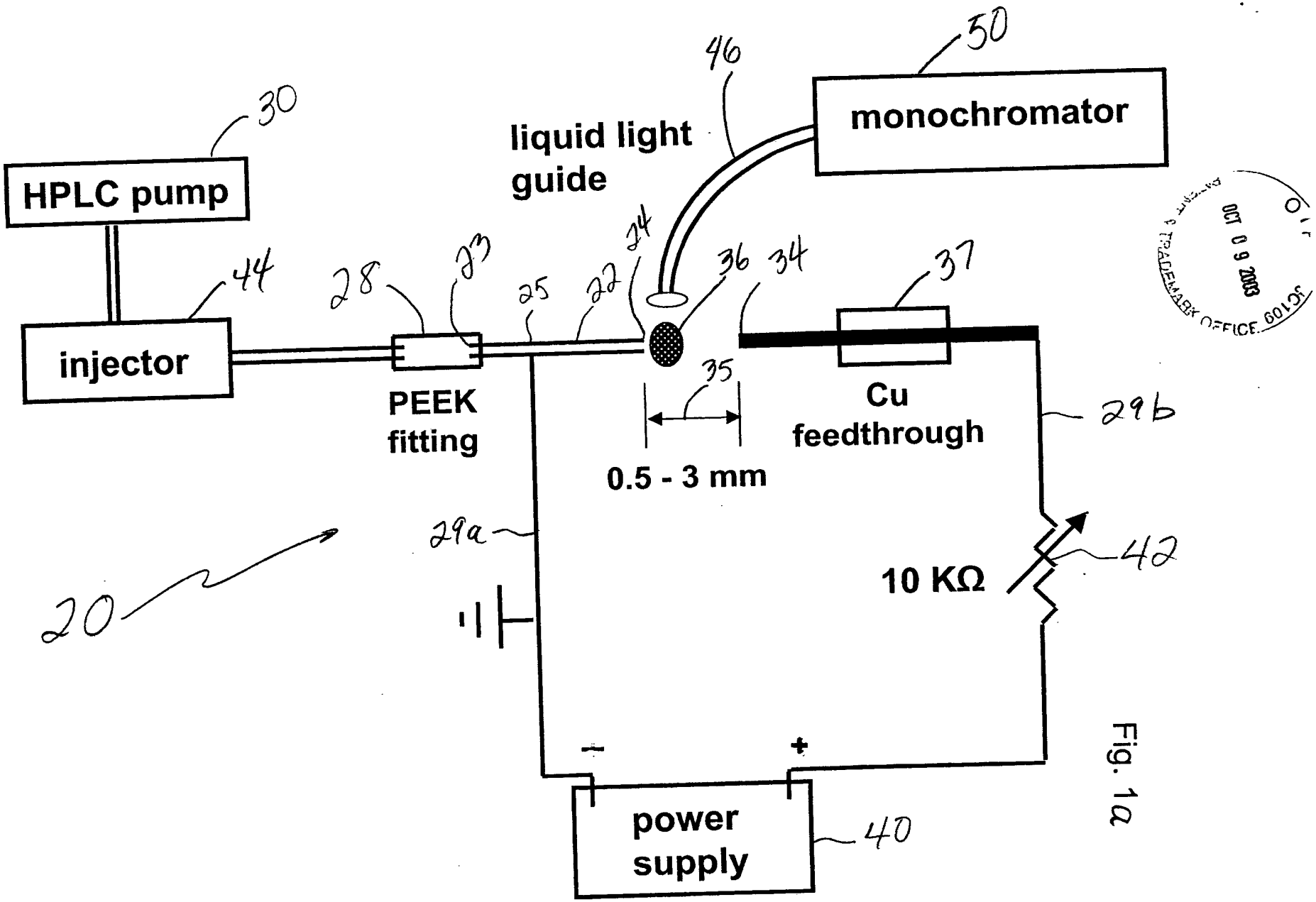
HPLC pump
30
injector
44
28
23
25
22
24
liquid light guide
46
36
34
monochromator
50
37
Cu feedthrough
29b
PEEK fitting
35
0.5 - 3 mm
29a
20
10 KΩ
42
power supply
40
−
+

Fig. 1a

Basic LS-APGD Source Operation

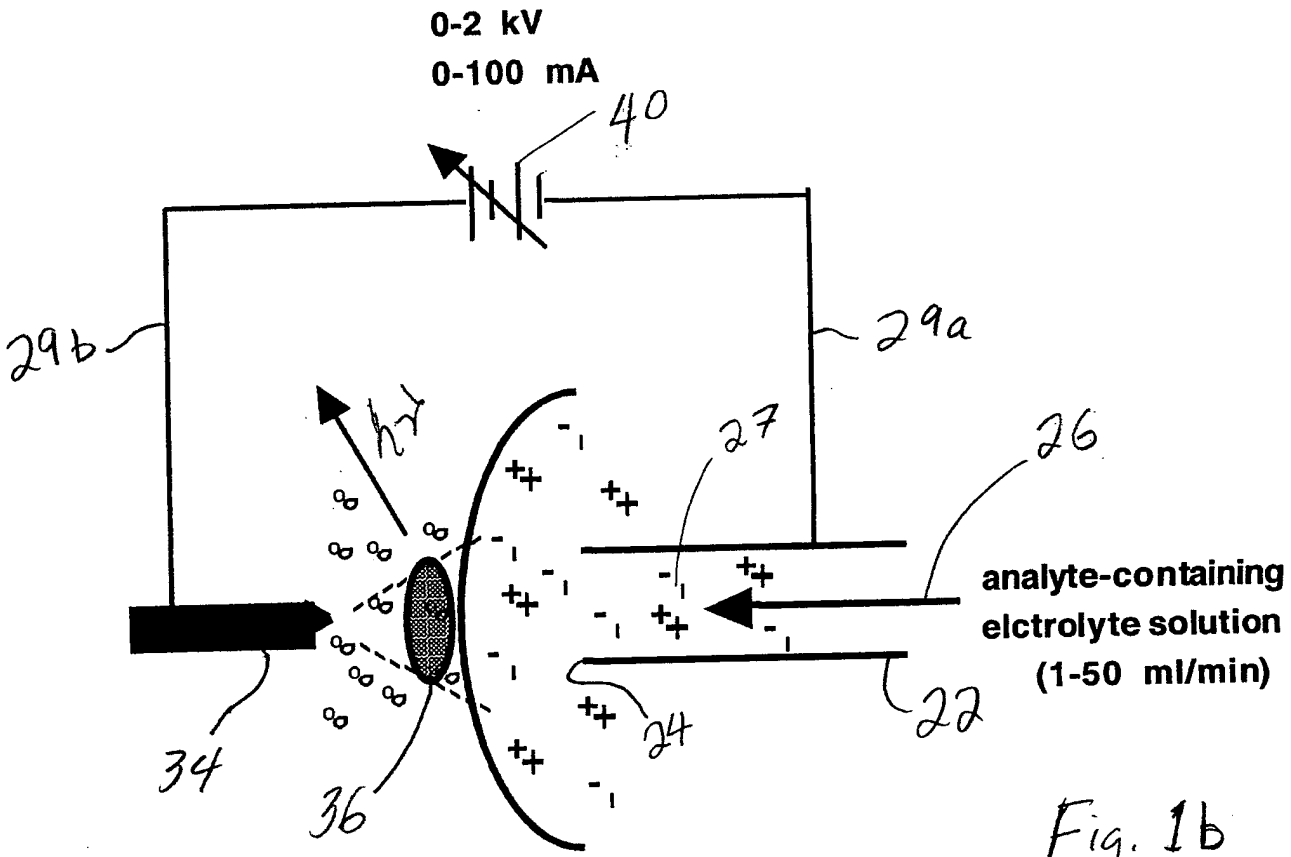

Fig. 1b

Proposed Implementation of LS-APGD with Microfluidic Devices

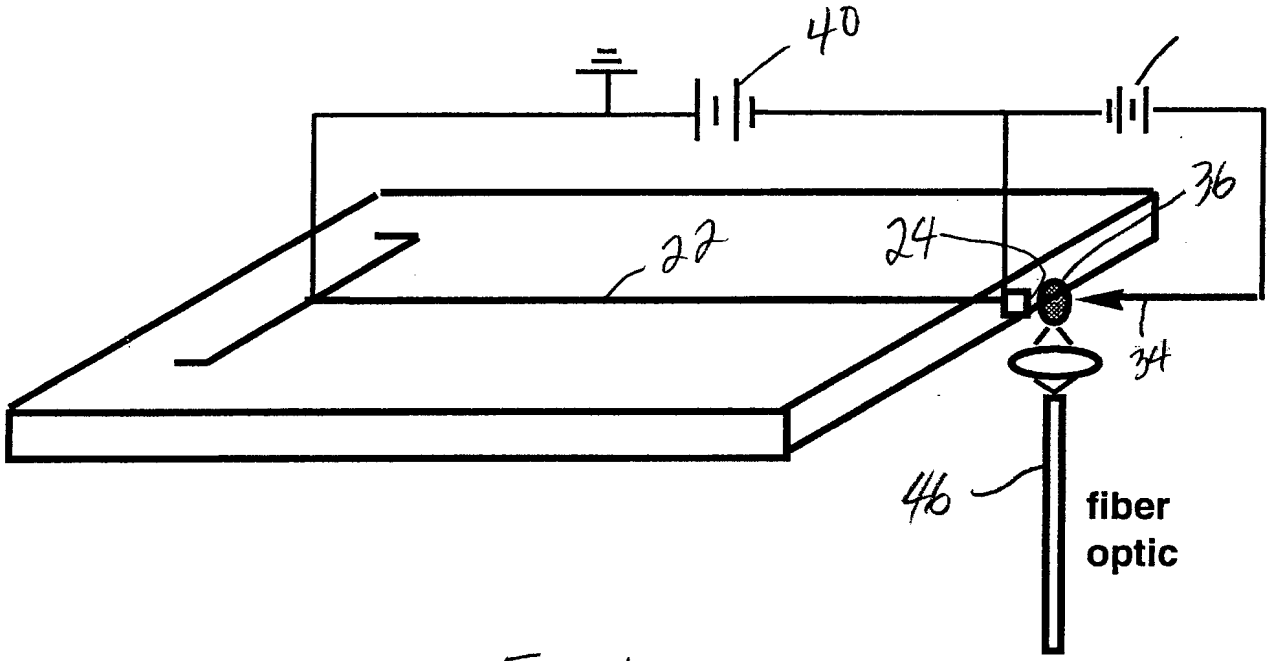

Fig. 1c

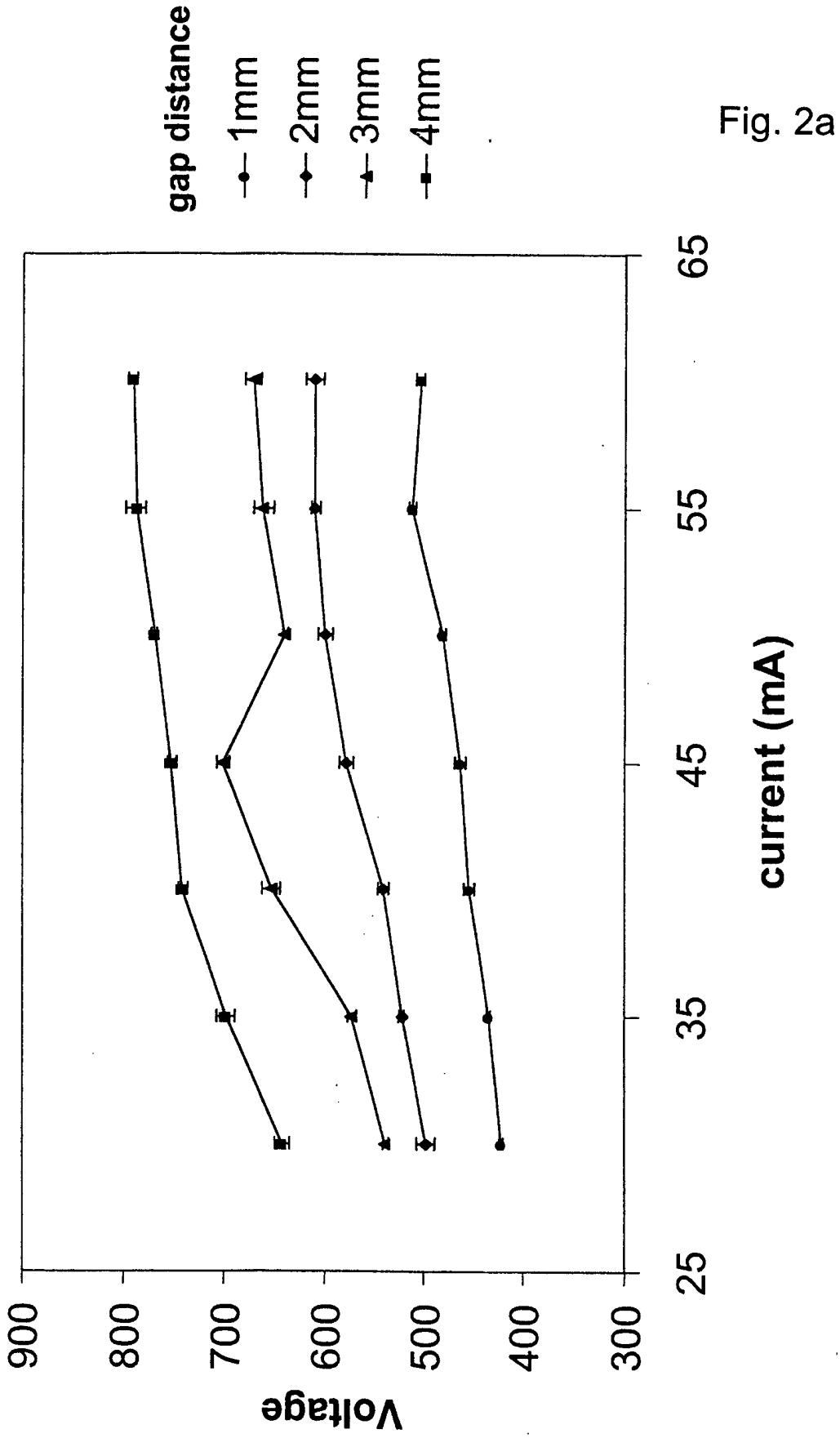
gap distance
1mm
2mm
3mm
4mm
Voltage
900
800
700
600
500
400
300
25
35
45
55
65
current (mA)

Fig. 2a

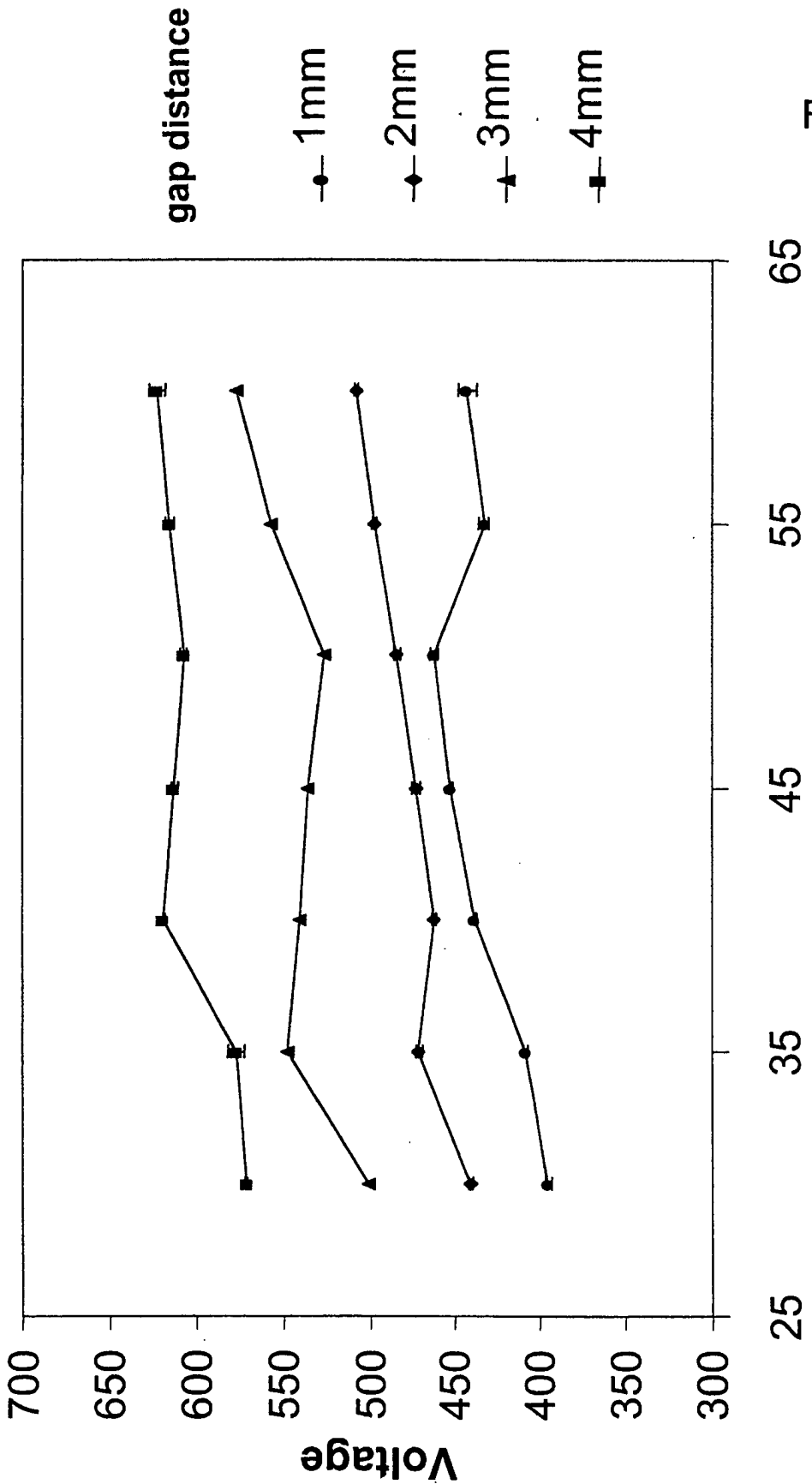
gap distance
1mm
2mm
3mm
4mm
Voltage
700
650
600
550
500
450
400
350
300
25
35
45
55
65
current (mA)

Fig. 2b

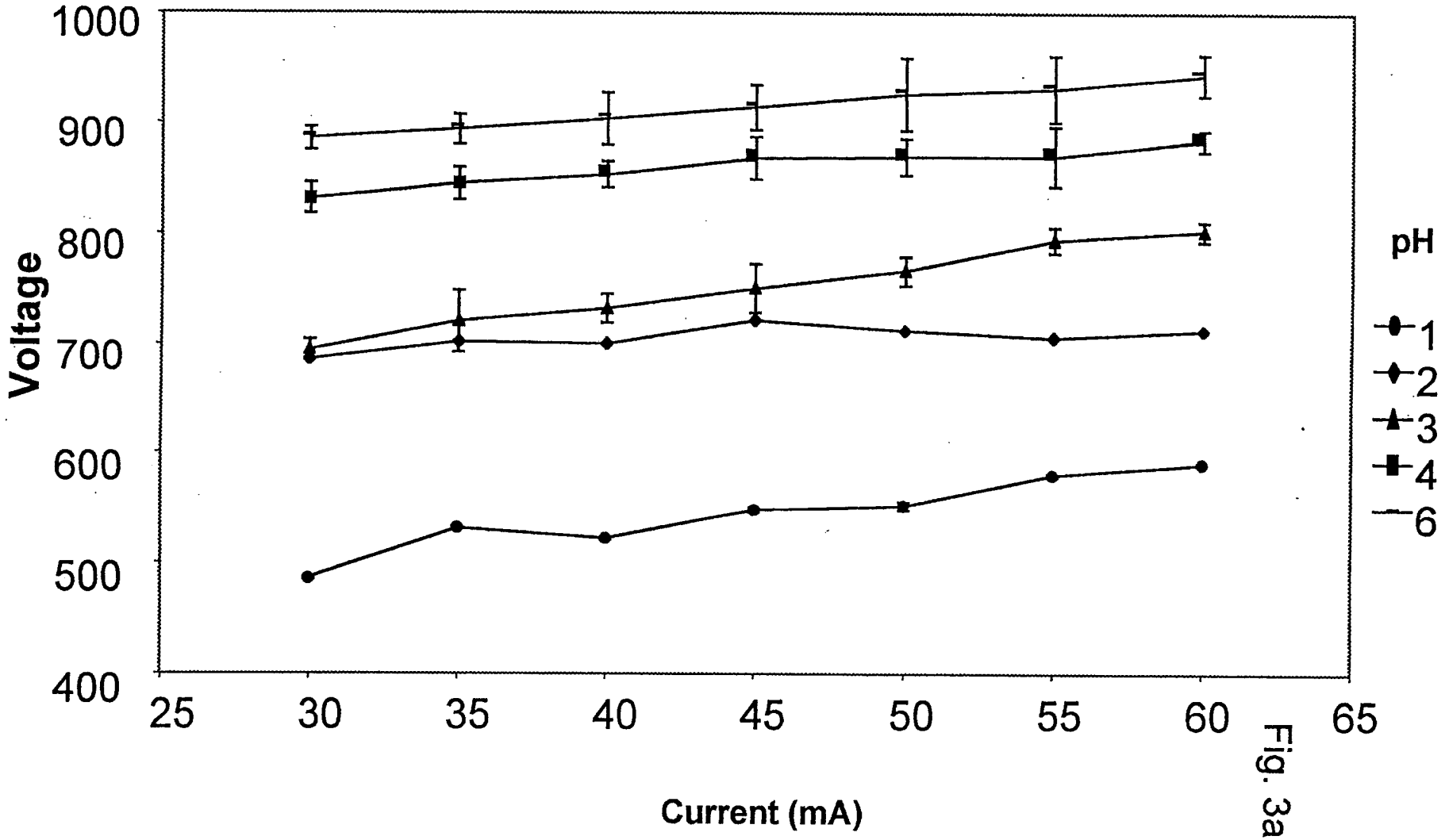
1000
900
800
700
600
500
400
Voltage
25
30
35
40
45
50
55
60
65
Current (mA)
pH
1
2
3
4
6

Fig. 3a

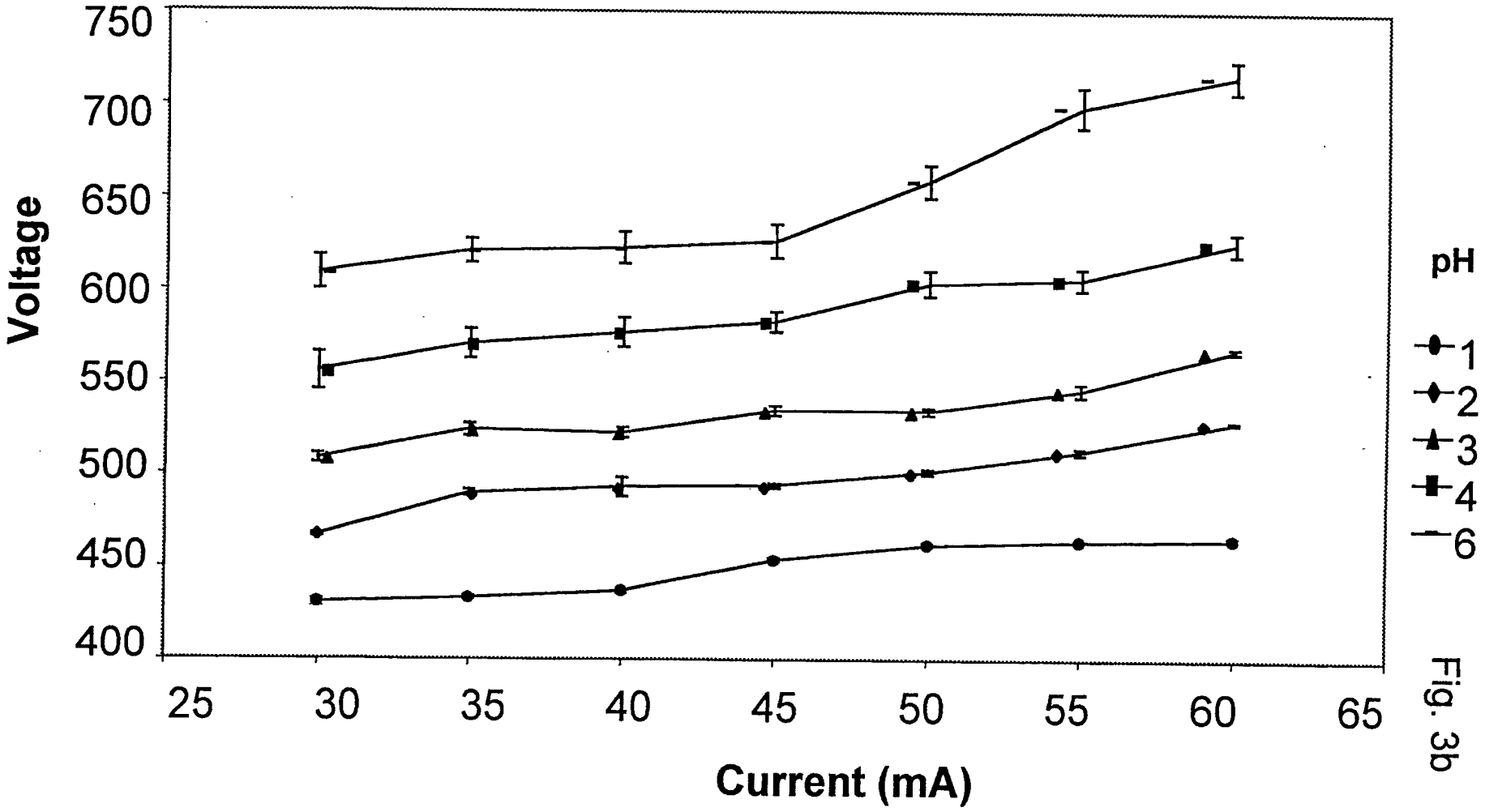
750
700
650
600
550
500
450
400
Voltage
25
30
35
40
45
50
55
60
65
Current (mA)
pH
1
2
3
4
6

Fig. 3b

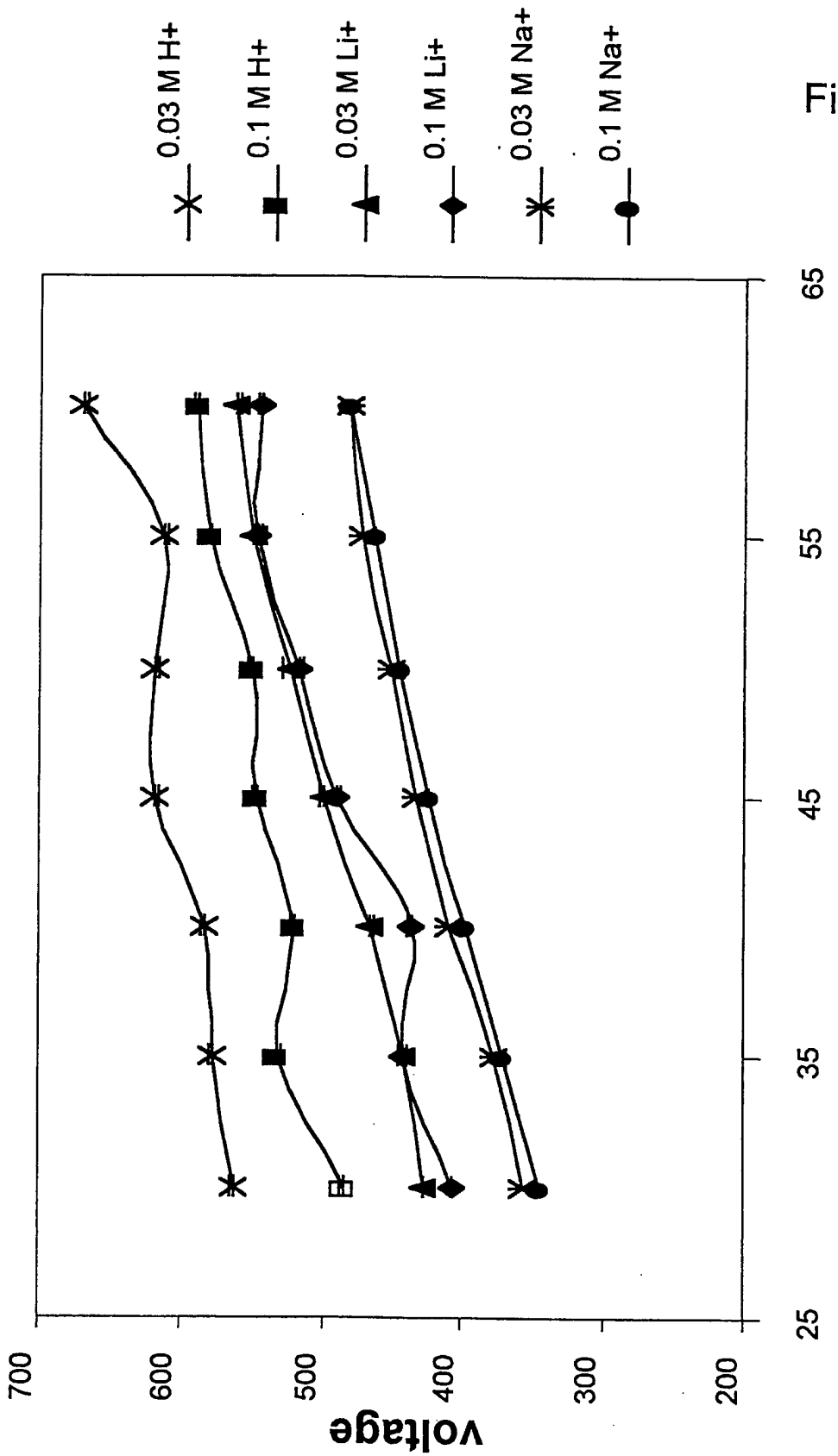
0.03 M H+
0.1 M H+
0.03 M Li+
0.1 M Li+
0.03 M Na+
0.1 M Na+
700
600
500
400
300
200
voltage
25
35
45
55
65
Current (mA)

Fig. 4a

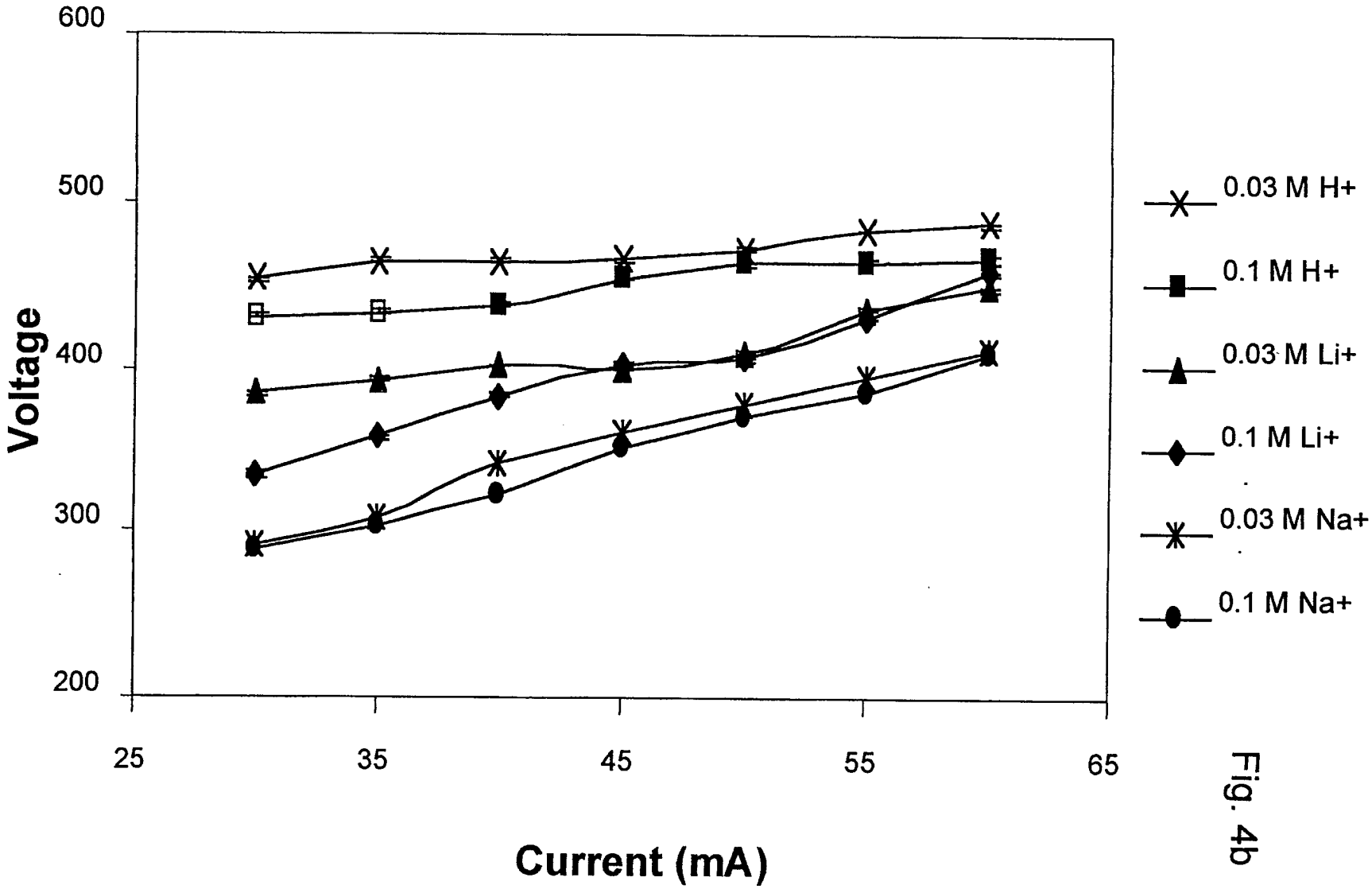
600
500
400
300
200
Voltage
25
35
45
55
65
Current (mA)
0.03 M H+
0.1 M H+
0.03 M Li+
0.1 M Li+
0.03 M Na+
0.1 M Na+

Fig. 4b

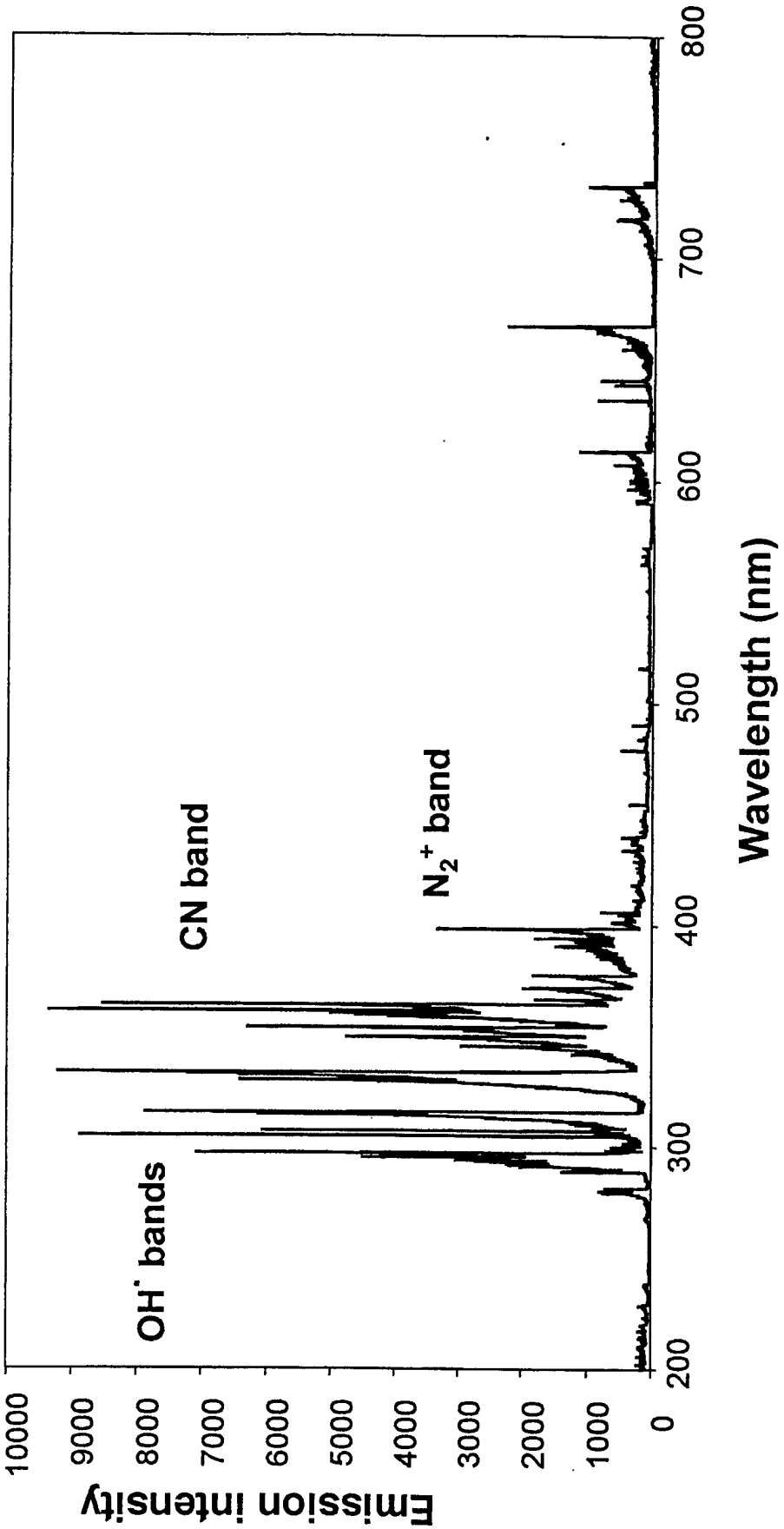
Emission intensity
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
200
300
400
500
600
700
800
Wavelength (nm)
OH˙ bands
CN band
N_2^+ band

Fig. 5

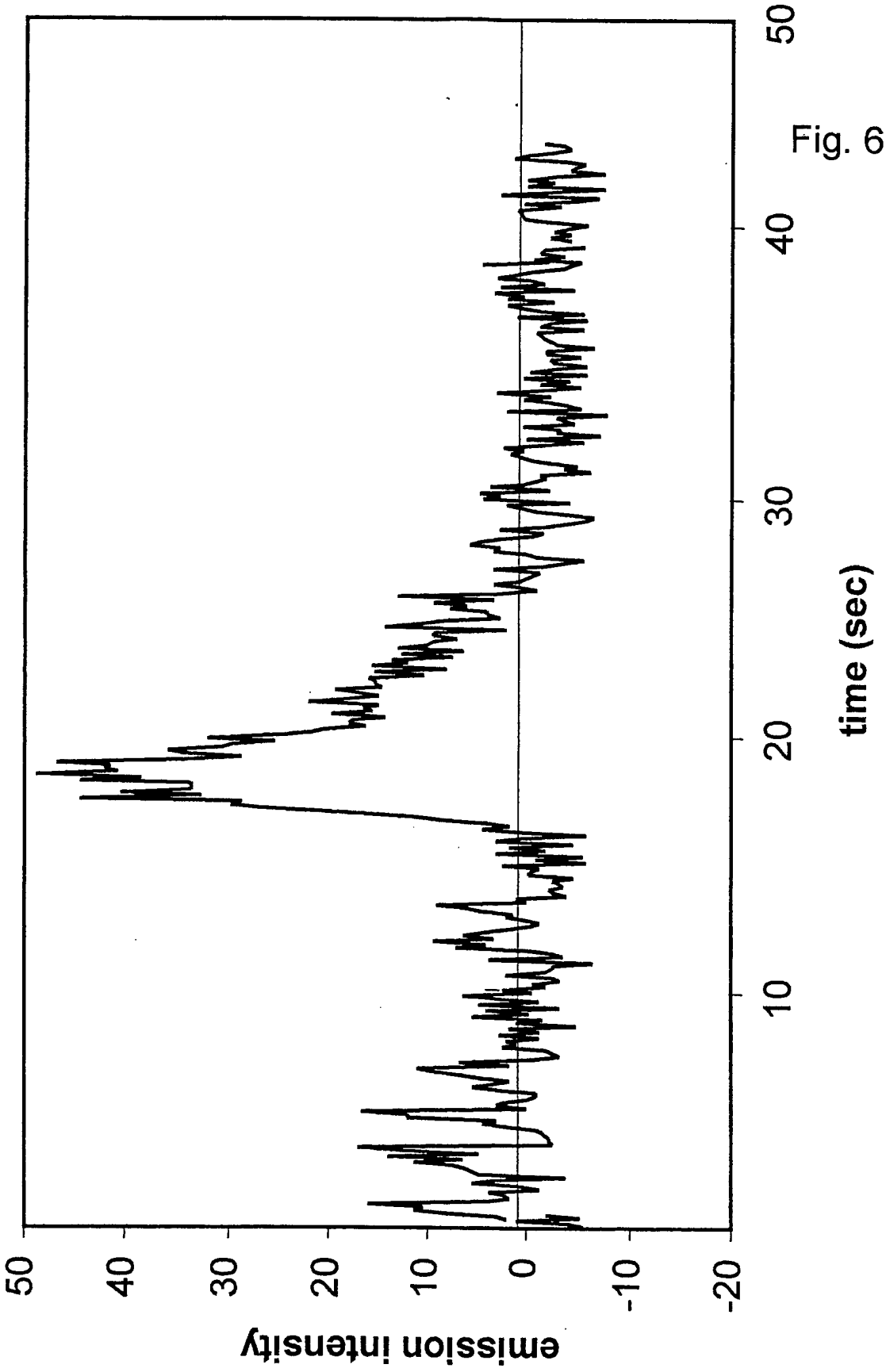

Fig. 6

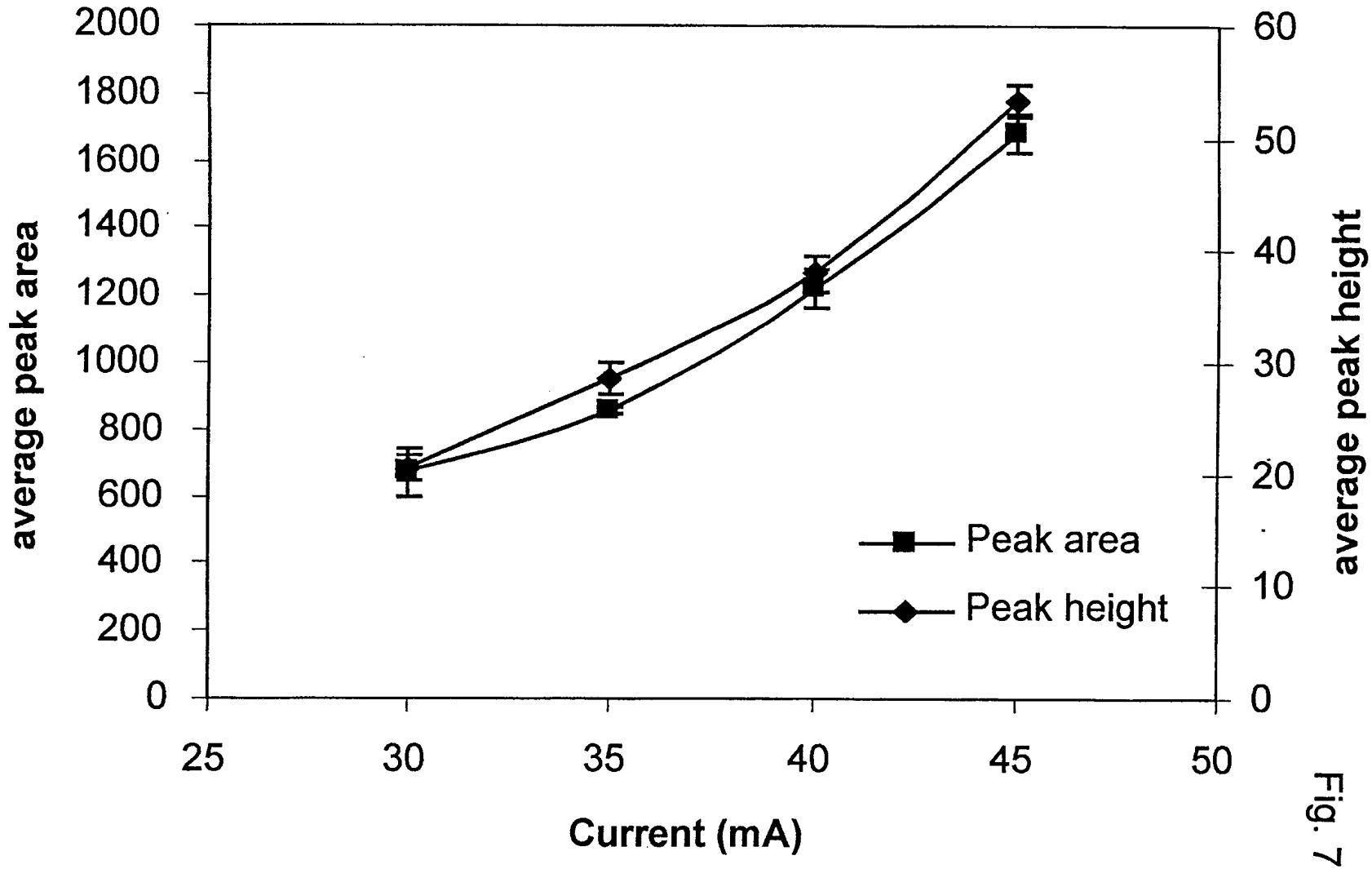
2000
1800
1600
1400
1200
1000
800
600
400
200
0
average peak area
60
50
40
30
20
10
0
average peak height
25
30
35
40
45
50
Current (mA)
Peak area
Peak height

Fig. 7

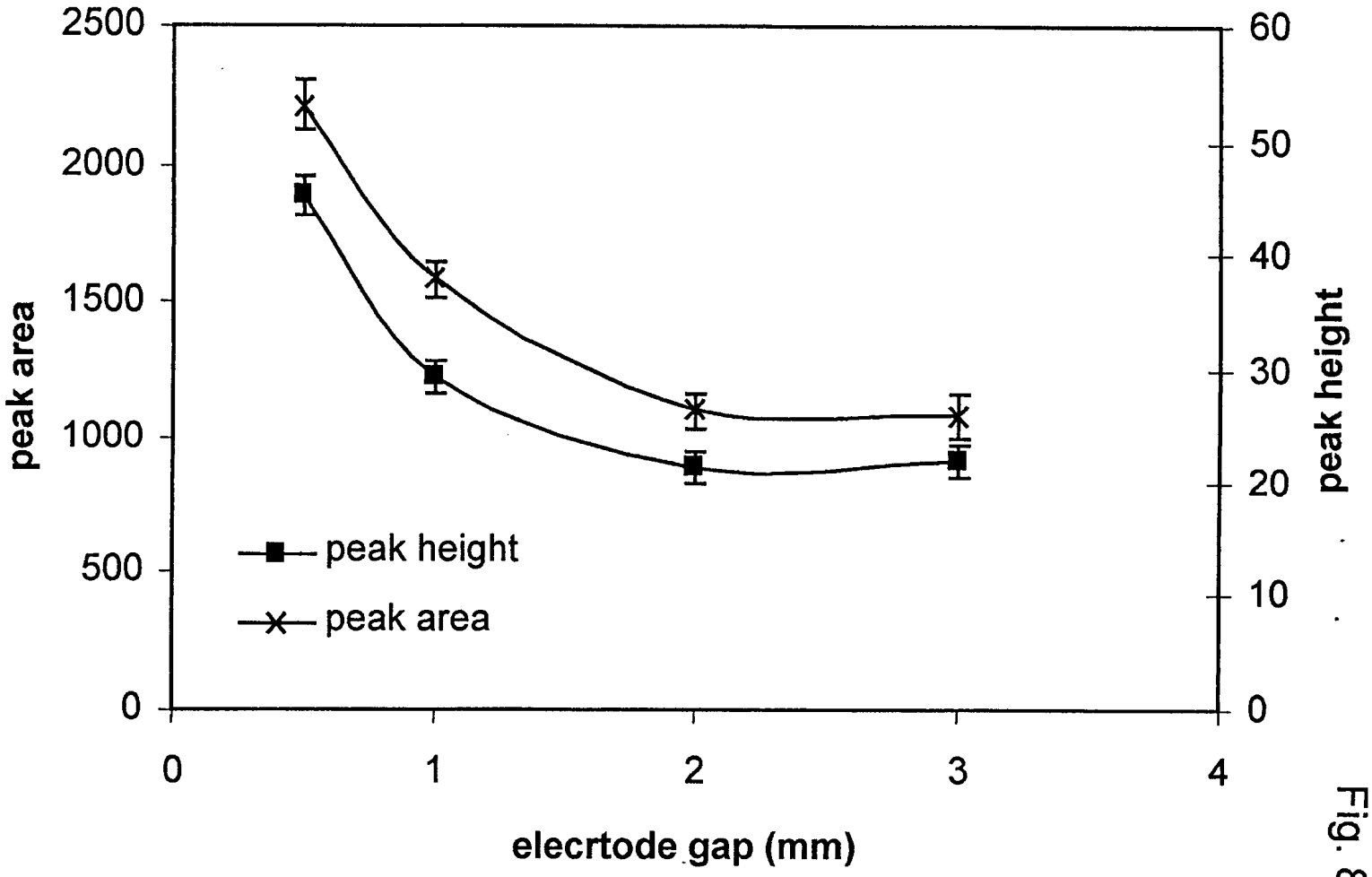
2500
2000
1500
1000
500
0
peak area
60
50
40
30
20
10
0
peak height
0
1
2
3
4
elecrtode gap (mm)
peak height
peak area

Fig. 8

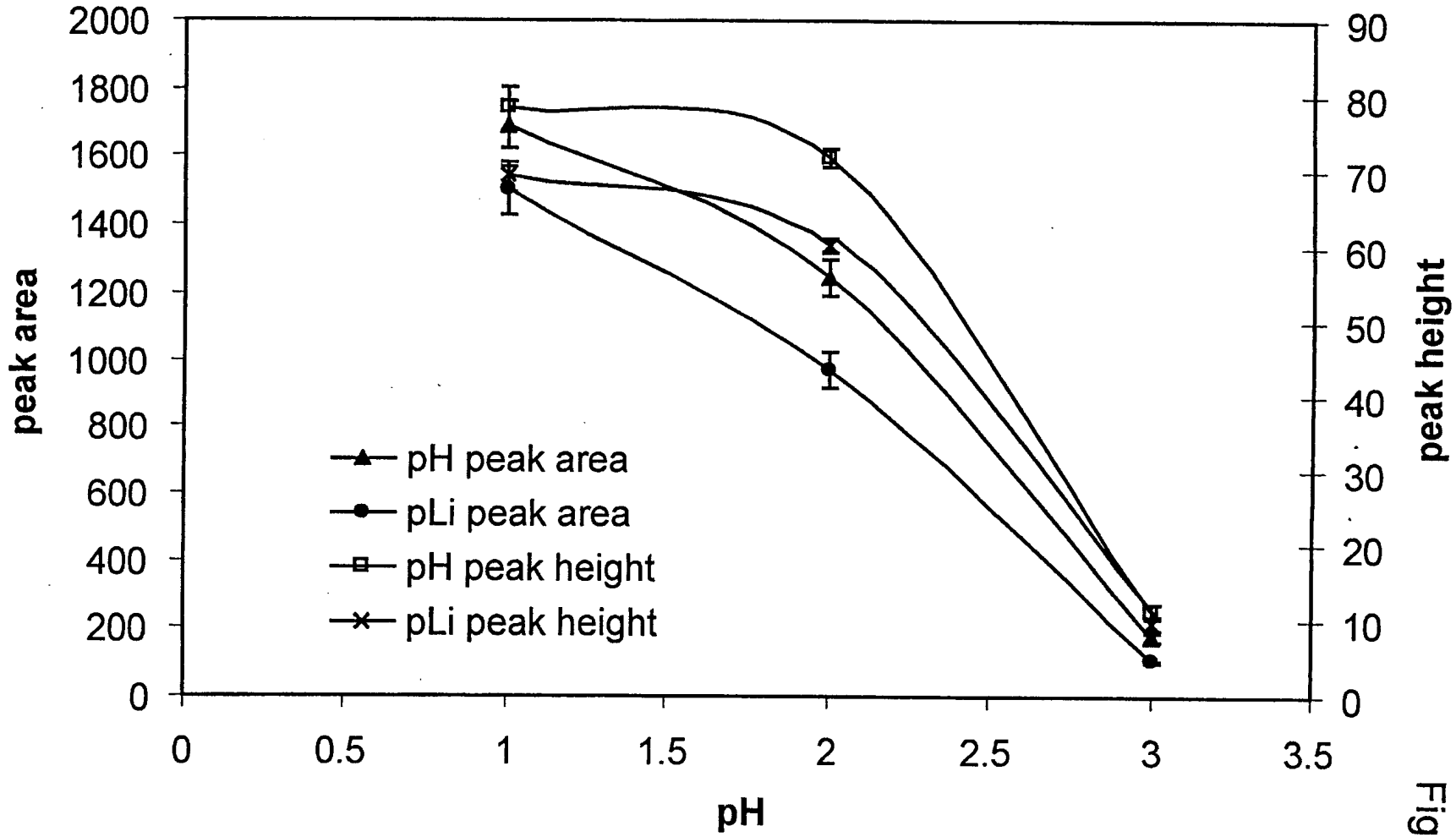
peak area
peak height
pH
2000
1800
1600
1400
1200
1000
800
600
400
200
0
90
80
70
60
50
40
30
20
10
0
0
0.5
1
1.5
2
2.5
3
3.5
pH peak area
pLi peak area
pH peak height
pLi peak height

Fig. 9

Analytical response functions and limits of detection for the LS-APGD device. Solution flow rate = 1 mL/min, electrolyte pH = 1, inter-electrode gap = 1 mm, injection volume = 5 µL.

Element	wavelength (nm)	peak height eqn.	peak height R^2	peak area eqn.	peak area R^2	LOD ppm (ng)
Na	589.0	y=0.421x + 42.8	0.9859	y=15.81x + 978.6	0.9784	12 (60)
Fe	248.3	y=1.06x - 102.1	0.9365	7=45.80 x - 6649	0.909	12 (60)
Pb	405.8	7=1.18x - 10.45	0.977	7=16.16x - 419.7	0.9298	14 (70)

FIG. 10

Fig. 1

Fig. 12

Fig. 13

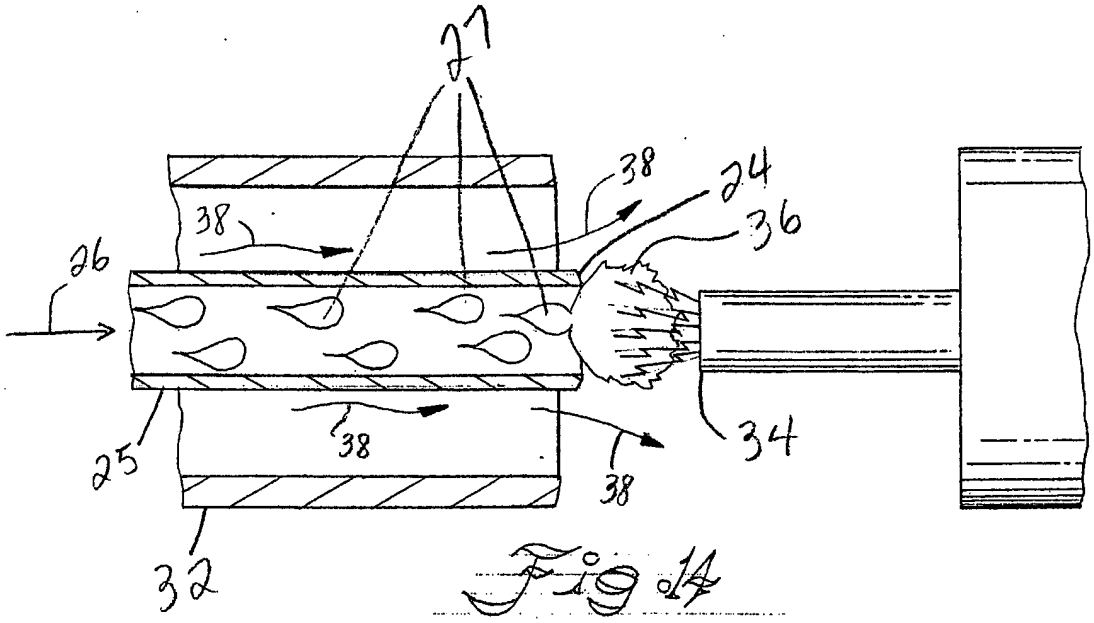

Fig. 1A

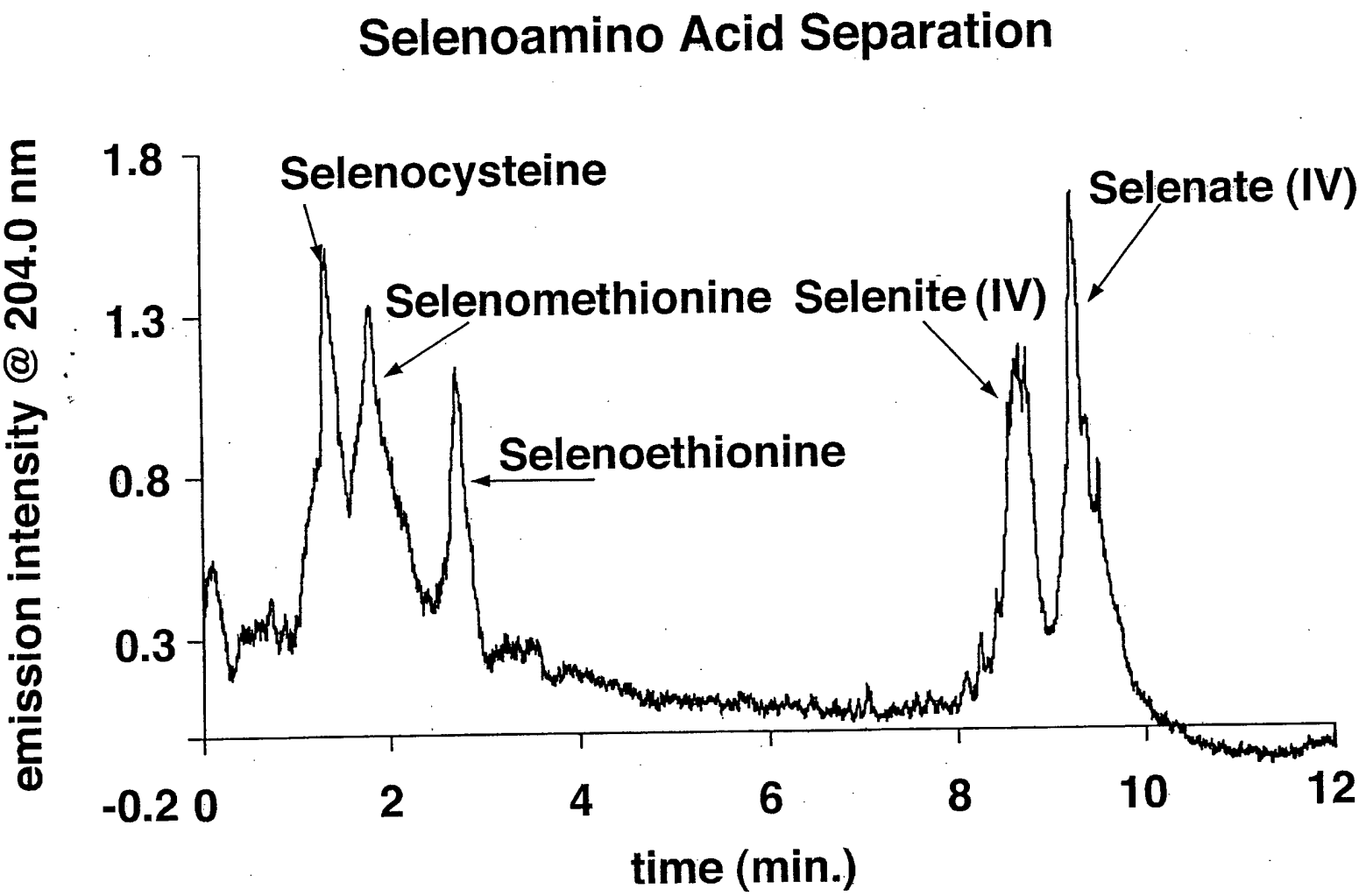
Selenoamino Acid Separation
emission intensity @ 204.0 nm
1.8
1.3
0.8
0.3
-0.2
0
2
4
6
8
10
12
time (min.)
Selenocysteine
Selenomethionine
Selenoethionine
Selenite (IV)
Selenate (IV)

Fig. 15